

WHAT IS CLAIMED IS

1. An electric motor comprising a rotor equipped with magnets and a stator having a plurality of slots, wherein:

5 said rotor or said stator is divided into 4 or 4n (n indicates an integer, 4 forms one group) pieces in an axial direction, and an axial length and an electrical angle of said each piece, assuming an axial length of said one group of said rotor core or said stator core as
10 2L, said axial direction as a X-axis, an axial center as $x=0$, and electromagnetic exciting force in a radial direction as $F(x)$, on the basis of following three relational formulas:

15
$$\int_{-L}^L F(x)dx = 0$$
$$\int_{-L}^L xF(x)dx = 0$$
$$F(-x) = -F(x)$$

are set according to a relationship between an equivalent axial length and an equivalent position
20 shifted between said pieces in a circumferential direction and are arranged in a setting order, and

 said each piece of said one group of said four pieces, as said equivalent axial length, is set to any axial length within a range from 0.19L, 0.81L, 0.81L, and
25 0.19L to 1/2L, 1/2L, 1/2, and 1/2L, and effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π .

2. An electric motor comprising a rotor equipped with magnets and a stator having a plurality of slots, wherein:

5 said rotor or said stator is divided into 4 or 4n (n indicates an integer, 4 forms one group) pieces in an axial direction, and an axial length and an electrical angle of said each piece, assuming an axial length of said one group of said rotor core or said stator core as 2L, said axial direction as a X-axis, an axial center as x=0, and electromagnetic exciting force in a radial
10 direction as F(x), on the basis of following three relational formulas:

$$\int_{-L}^L F(x)dx = 0$$

15 $\int_{-L}^L xF(x)dx = 0$

$$F(-x) = -F(x)$$

are set according to a relationship between an equivalent axial length and an equivalent position shifted between said pieces in a circumferential
20 direction and are arranged in a setting order, and

said each piece of said one group of said four pieces, as said equivalent axial length, is set to any axial length within a range from 0.19L, 0.81L, 0.81L, and 0.19L to 0.39L, 0.61L, 0.61L, and 0.39L, and effective
25 pole opening angles are arranged in a circumferential direction as phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π .

3. An electric motor comprising a rotor equipped

with magnets and a stator having a plurality of slots,
wherein:

said rotor or said stator is divided into 4 or 4n (n
indicates an integer, 4 forms one group) pieces in an
5 axial direction, and an axial length and an electrical
angle of said each piece, assuming an axial length of
said one group of said rotor core or said stator core as
2L, said axial direction as a K-axis, an axial center as
x=0, and electromagnetic exciting force in a radial
10 direction as F(x), on the basis of following three
relational formulas:

$$\int_{-L}^L F(x)dx = 0$$

$$\int_{-L}^L xF(x)dx = 0$$

15 $F(-x) = -F(x)$

are set according to a relationship between an
equivalent axial length and an equivalent position
shifted between said pieces in a circumferential
direction and are arranged in a setting order, and

20 said each piece of said one group of said four
pieces, as said equivalent axial length, on the basis of
1:2:2:1, is set to any axial length within a range of $\pm 5\%$
of a total axial length of said one group of said four
pieces, and effective pole opening angles are arranged in
25 the circumferential direction as a phase difference of
electrical angles of said neighboring pieces equivalent
to 0, π , 0, and π .

4. An electric motor comprising a rotor equipped

with magnets and a stator having a plurality of slots,
wherein:

said rotor or said stator is divided into 6 or 6n (n
indicates an integer, 6 forms one group) pieces in an
axial direction, and an axial length and an electrical
angle of said each piece, assuming an axial length of
said one group of said rotor core or said stator core as
2L, said axial direction as a X-axis , an axial center as
x=0, and electromagnetic exciting force in a radial
direction as F(x), on the basis of following three
relational formulas:

$$\int_{-L}^L F(x)dx = 0$$

$$\int_{-L}^L xF(x)dx = 0$$

$$F(-x) = -F(x)$$

are set according to a relationship between an
equivalent axial length and an equivalent position
shifted between said pieces in a circumferential
direction and are arranged in a setting order, and

said each piece of said one group of said six pieces,
as said equivalent length, on the basis of 0.25L, 0.50L,
0.25L, 0.25L, 0.50L, and 0.25L, is set to any axial
length within a range of $\pm 5\%$ of a total axial length of
said one group of said six pieces,

or within a range from 0.25L, 0.50L, 0.25L, 0.25L,
0.50L, and 0.25L to 1/3L, 1/3L, 1/3L, 1/3L, 1/3L, and
1/3L, and effective pole opening angles are arranged in
the circumferential direction as a phase difference of

electrical angles of said neighboring pieces equivalent to 0, π , 0, and π .

5 5. An electric motor comprising a rotor equipped with magnets and a stator having a plurality of slots, wherein:

10 said rotor or said stator is divided into 6 or 6n (n indicates an integer, 6 forms one group) pieces in an axial direction, and a longitudinal length and an electrical angle of said each piece, assuming an axial length of said one group of said rotor core or said stator core as 2L, said axial direction as a X-axis, an axial center as x=0, and electromagnetic exciting force in a radial direction as F(x), on the basis of following three relational formulas:

15

$$\int_{-L}^L F(x)dx = 0$$

$$\int_{-L}^L xF(x)dx = 0$$

$$F(-x) = -F(x)$$

20 are set according to a relationship between an equivalent axial length and an equivalent position shifted between said pieces in a circumferential direction and are arranged in a setting order, and

25 said each piece of said one group of said six pieces, as said equivalent length, on the basis of 0.25L, 0.50L, 0.25L, 0.25L, 0.50L, and 0.25L, is set to any axial length within a range of $\pm 5\%$ of a total axial length of said one group of said six pieces, and effective pole

opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to $0, \pi, 0, \text{ and } \pi$.

6. An electric motor comprising a rotor equipped
5 with magnets and a stator having a plurality of slots,
wherein:

said rotor or said stator is divided into even
pieces such as 4 pieces or more in an axial direction,
and an axial length and an electrical angle of said each
10 piece, assuming an axial length of said rotor core or
said stator core as $2L$, said axial direction as a X-axis,
an axial center as $x=0$, and electromagnetic exciting
force in a radial direction as $F(x)$, on the basis of
following three relational formulas:

15
$$\int_{-L}^L F(x) dx = 0$$
$$\int_{-L}^L xF(x) dx = 0$$
$$F(-x) = -F(x)$$

are set according to a relationship between an
20 equivalent axial length and an equivalent position
shifted between said pieces in a circumferential
direction and are arranged in a setting order.

7. An electric motor comprising a rotor equipped
with magnets and a stator having a plurality of slots,
25 wherein:

said rotor or said stator is divided into 4 or $4n$ (n
indicates an integer, 4 forms one group) pieces in an
axial direction, and electromagnetic exciting force in a

radial direction having a practically same amplitude is applied to said each piece, and

assuming an axial length of said one group of said rotor or said stator as $2L$, said each piece of said one group of said four pieces, as an equivalent axial length, is set to any axial length within a range from $0.19L$, $0.81L$, $0.19L$, $0.81L$ to $0.39L$, $0.61L$, $0.61L$, and $0.39L$, and effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0 , π , 0 , and π .

8. An electric motor composed of a rotor equipped with magnets and a stator having a plurality of slots, wherein:

said rotor or said stator is divided into 4 or $4n$ (n indicates an integer, 4 forms one group) pieces in an axial direction, and electromagnetic exciting force having a practically same amplitude in a radial direction is applied to said each piece, and

said each piece of said one group of said four pieces, as an equivalent axial length, on the basis of $1:2:2:1$, is set to any axial length within a range of $\pm 5\%$ of a total axial length of said one group of said four pieces, and effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0 , π , 0 , and π .

9. An electric motor comprising a rotor equipped

with magnets and a stator having a plurality of slots,
wherein:

said rotor or said stator is divided into 6 or $6n$ (n
indicates an integer, 6 forms one group) pieces in an
5 axial direction, and electromagnetic exciting force in a
radial direction having a practically same amplitude is
applied to said each piece, and

assuming an axial length of said one group of said
rotor or said stator as $2L$, said each piece of said one
10 group of said six pieces, as said equivalent axial length,
on the basis of $0.25L$, $0.50L$, $0.25L$, $0.25L$, $0.50L$, and
 $0.25L$, is set to any axial length within a range of $\pm 5\%$
of a total axial length of said one group of said six
pieces, and effective pole opening angles are arranged in
15 the circumferential direction as a phase difference of
electrical angles of said neighboring pieces equivalent
to 0 , π , 0 , and π .

10. An electric motor according to any of Claims 1
to 9, wherein said effective pole opening angles of said
20 each piece are set to an angle shifted by one half of
said slot between said pieces.

11. An electric motor according to any of Claims 1
to 10, wherein when said electric motor is a linear motor,
said rotor and said stator are in a shape developed on a
25 plane.